Math 3C Midterm 2 Study Guide

November 13, 2014

Acknowledgement I want to say thanks to Mark Kempton for letting me update this study guide for my class.

General Information: The test will be held Thursday, November 20 in class at 7:00pm in 214 Center Hall. The test will technically cover all of the material seen in class up to section 7.2, but will have special (mostly all) emphasis on sections 4.3 through 7.2 (which were covered in class, i.e. not 4.4 or 6.2). There will be about 6 free response questions. To receive full credit, show all your work or explain your reasoning. Even if you get an answer wrong, you can still get a significant amount of partial credit if you have good reasoning or a correct setup. You are required to bring a Blue Book, which is where you will work out your answers. You are allowed to bring with you 1 sheet of handwritten notes. No calculators or electronic devices will be permitted.

The following is a summary of each section and the relevant material. It is not intended to be an exhaustive list of everything that could possibly be on the test, but is a guide to help you focus your study on the most relevant material.

4.3

Be familiar with:

- What a rational function is, and domain of a rational function.

- Be able to do division of polynomials–there is the technique the text book describes (which we never covered in class), or long division (which we did cover in class)–and remember that division is typically only done if the degree of the top is greater than or equal to the degree of the bottom.

- Be able to describe the long-term behavior of a rational function (behavior at infinity), including identifying horizontal asymptotes. Remember there are three cases for this: degree of top bigger than degree of bottom, degree of top equal to degree of bottom, degree of top less than degree of bottom.

Don't worry about: Graphing rational functions.

Suggested practice problems: 1-4, 29-34, 36-38.

5.1

Be familiar with:

- What a rational exponent means.

- How to find the inverse of $f(x) = x^m$.

- All the rules of exponents, including the rules of square roots.

- The definition of an exponential function.

- The basic shapes of the graphs of exponential functions.

Suggested practice problems: 13-20, 21-32, 33-38, 39-46.

5.2

   Be familiar with:

- The definition of a logarithm, especially thinking of logs as inverses of exponential functions.

- Be able to take the log of a number when it can be computed exactly.

- The radioactive decay formula, and the concept of half-life.

   Don't worry about: The relationship between the log and the number of digits in a number.

   Suggested practice problems: 1-20, 21-28, 29-34, 49-66.

5.3

   Be familiar with:

- All the log rules (product to sum, quotient to difference, power to product). Be careful to apply these correctly!

- The change of base formula.

   Don't worry about: Richter or decibel scales, or apparent magnitude. If this does end up on the test, I will present all of the formulas needed.

   Suggested practice problems: 11-12, 13-26, 27-30, 35-38, 43(a), 44(a).

5.4

   Be familiar with:

- The definition of exponential growth.

- Be able to find the exponential function passing through a couple of points.

- Know that the log of an exponential is linear.

- The formula for population growth involving doubling time (page 334).

- The formula for compound interest (page 340).

Don't worry about: Simple interest. Also, don't worry about anything that would require a calculator. If you get a problem that you would normally use a calculator on, just leave your answer unsimplified (in terms of logs or exponents).

Suggested practice problems: 13-14, 13-29, 31-32.

6.1

Be familiar with:

- The special number e and the exponential function e^x, and the natural logarithm $\ln x$.

- Know the domain and range of exponential and log functions.

Don't worry about: All the weird stuff with area in this section.

Suggested practice problems: 7-16, 17-22, 23-26, 35-38, 39-48.

6.3

Be familiar with:

- The formula for continuously compounding interest.

- The formula for continuous population growth (using continous growth rates)

- The relationship between continuous growth rates and doubling time.

Don't worry about: The approximate formulas for doubling time and doubling rate. And once again, if you get a problem where you would normally use a calculator, just leave your answer unsimplified.

Suggested practice problems: 1-16.

7.1

Be familiar with:

- What systems of equations are, and what it means to be a solution to an equation. (Always plug your answer back in to the original question to check it!)

- Thinking of systems visually.

- Solving systems by substitution.

Suggested practice problems: 5-20.

7.2

Be familiar with:

- What linear equations are.

- Solving linear systems using substitution or Gaussian elimination.

Suggested practice problems: 1-14.

General Tips:

- Try to avoid the common algebra errors that really annoy math teachers (remember $(a + b)^2 \neq a^2 + b^2$, remember to distribute $-$ signs, etc.).

- Try to check your work as much as possible, and think about if your answer is reasonable. Often you can plug your answer back in to the question to see if it satisfies what it is supposed to.

- Don't necessarily expect your answers to all come out as nice numbers. If you get something like $\frac{2+\sqrt{5}}{3}$, just leave it like that.

- In general, it is good practice to simplify answers as much as possible, but if you are feeling pressed for time, just leave an answer unsimplified, and come back and simplify it later if there is time.

- Be calm and confident. If you have mastered the homework, then you know what you are doing.